BLOOD FLOW MEASUREMENTS WITH THE PULSED DOPPLER METHOD IN NORMAL AND SMALL-FOR-DATE FETUSES AND FETUSES TREATED WITH TOCOLYTIC SUBSTANCES IN THE LAST TRIMENON

FENDEL, H., M. FENDEL, A. PAUEN, G. LAMBERTI

Department of Gynäkologie and Geburtshilfe der RWTH Aachen,
Chairman: Prof. Dr. med. H. Jung

Gated, pulsed, doppler ultrasound was used to study blood flow in the fetal aorta. A Kranzbühler duplex system was used for all measurements. 130 single pregnancies were studied in between the 27th and 42nd gestational week. From the 130 cases 88 pregnancies passed normally. 42 pregnancies were complicated. 17 patients got a treatment with beta-adrenergic stimulants to prevent a threatened premature dilivery. 16 fetuses were measured and later born as small for gestational age babies. In 9 pregnancies there were both complications, a tocolytic treatment and a small for gestational age fetuses. The mean velocity in fetal aorta in normal pregnancies is 31 cm/sec. The tocolytic treated fetuses had a mean blood velocity of 38 cm/sec. The small for gestational age fetuses had a mean blood velocity of 28 cm/sec.
The tocolytic treated and dystroph fetuses had the same blood velocity like the fetuses of the normal pregnancies. The standard deviation amounts for all studied groups $\pm$ 5 cm/sec.
There is a high significant difference between the normal and the beta-adrenergic stimulants treated pregnancies ($p < 0{,}00005$). There was a slight significant difference between the mean velocity of normal and SGA fetuses. ($p < 0{,}0364$).
Only in 82 cases the flow in fetal aorta was calculated as only in this cases the vessel diameter was measured. The mean aortic blood flow of 49 normal fetuses is 192 $\pm$ 33 ml/min/Kg. There is no difference to the 11 small for age fetuses which have a mean flow of 186 $\pm$ 33 ml/min/Kg. The 17 tocolytic treated fetuses have a relative blood flow of 226 $\pm$ 50 ml/min/Kg. Comparing with the normal fetuses there is a slight significant difference ($p < 0{,}0135$). The relative blood flow of the tocolytic treated and dystroph fetuses is 234 $\pm$ 30 ml/min/Kg. This group is too small to come to a serious conclusion.
The presented studies show that there is a high significant increase in fetal aortic blood velocity when tocolytic agents are given in pregnancy. This effect is seen more weak if relative blood flow is calculated from the velocity and vessel diameter. The beta-adrenergic stimulants pass from mother to fetus and by their positive inotropisim fetal blood velocity and flow is increased.
Aortic blood velocity of small for age fetuses is reduced comparing with normal fetuses. Possibly it is an effect of the higher blood hematocrit and higher viskosity of dystroph fetuses. The other reason could be the higher resistance of vessels in the uteroplacental system. Do small for age fetuses get a tocolytic treatment one effect takes off the other effect. The blood velocity is

in the same range as this one of normal fetuses. The presented differences are seen very clearly in blood velocity, but only partly or more weak in relative blood flow. It is very difficult to measure the exact vessel diameter. Therefore at present time it seems more wise to calculate only velocity because this parameter is independent from vessel diameter and fetal weight.